

CLAIMS

What is claimed is:

- 1 ~~1.~~ A method of efficiently transmitting media information associated with two or more
2 concurrent calls carried in a packet-switched network, the method comprising the
3 computer-implemented steps of:
4 aggregating two or more media packets from the two or more concurrent calls
5 originating from one or more source end points into an aggregated media
6 payload;
7 re-packetizing the aggregated media payload using a single aggregated header to form
8 an aggregated media packet;
9 forwarding the aggregated media packet to a next hop in the packet-switched network.
- 1 2. The method of Claim 1, further comprising de-aggregating the aggregated media
2 payload for one or more destination endpoints by separating the aggregated media
3 payload to result in creating and sending restored copies of the two or more media
4 packets, wherein each media packet corresponds to one of the two or more concurrent
5 calls.
- 1 3. The method of Claim 1, wherein aggregating the two or more media packets
2 comprises compressing one or more headers of each media packet.
- 1 4. The method of Claim 1, wherein the two or more media packets are Real-Time
2 Protocol (RTP) packets.

1 5. The method of Claim 4, wherein the step of aggregating two or more media packets
2 further comprises the steps of:
3 compressing an IP header and a UDP header of each RTP packet to form a
4 corresponding uncompressed RTP segment; and
5 encapsulating the two or more uncompressed RTP segments with the single
6 aggregated header.

1 6. The method of Claim 4, wherein the step of aggregating two or more media packets
2 further comprises the steps of:
3 compressing an IP header, a UDP header, and an RTP header of each RTP packet to
4 form a corresponding compressed RTP segment; and
5 encapsulating the two or more compressed RTP segments with the single aggregated
6 header.

1 7. The method of Claim 1, wherein the step of aggregating the two or more media
2 packets further comprises forming the aggregated media payload according to an
3 aggregation protocol that has a reduced sensitivity to media packet loss for
4 aggregating the two or more media packets.

1 8. The method of Claim 7, wherein the aggregation protocol comprises forming the
2 aggregated media payload based on an aggregated media packet format for each
3 aggregated media packet wherein the aggregated media packet format comprises a
4 version field indicating a version of the aggregation protocol.

1 9. The method of Claim 7, wherein the aggregation protocol comprises forming the
2 aggregated media payload based on an aggregated media packet format for each
3 aggregated media packet wherein the aggregated media packet format comprises a
4 placeholder field that reserves packet space for future use.

1 10. The method of Claim 7, wherein the aggregation protocol comprises forming the
2 aggregated media payload based on an aggregated media packet format for each
3 aggregated media packet wherein the aggregated media packet format comprises a
4 sequence number field that is incremented for each aggregated media packet and is
5 used to detect media packet loss.

1 11. The method of Claim 7, wherein the aggregation protocol comprises forming the
2 aggregated media payload based on an aggregated media packet format for each
3 aggregated media packet wherein the aggregated media packet format comprises a
4 trunk ID field that uniquely identifies a corresponding trunk.

1 12. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a context ID field indicating a session context ID
5 for the uncompressed Real-Time Protocol segment.

1 13. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a compression bit indicating whether the
5 uncompressed Real-Time Protocol segment is uncompressed.

1 14. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a placeholder field for future use.

1 15. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a Real-Time Protocol header extension bit
5 indicating whether a Real-Time Protocol header extension appears in the
6 uncompressed Real-Time Protocol segment.

1 16. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that includes a full length field containing a length of a Real-

5 Time Protocol packet that corresponds to the uncompressed Real-Time Protocol
6 segment.

1 17. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a Real-Time Protocol payload and a Real-Time
5 Protocol header corresponding to a Real-Time Protocol packet that in turn
6 corresponds to the uncompressed Real-Time Protocol segment.

1 18. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on an uncompressed Real-Time Protocol
3 segment format for each uncompressed Real-Time Protocol segment of the two or
4 more media packets that comprises a padding field that aligns an end of the
5 uncompressed Real-Time Protocol segment with a next four-byte boundary.

1 19. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a context ID field indicating a session context ID for the
5 compressed Real-Time Protocol segment.

1 20. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a compression bit indicating whether the Real-Time Protocol
5 segment is compressed.

1 21. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a Real-Time Protocol header extension bit indicating whether
5 a Real-Time Protocol header extension appears in the compressed Real-Time Protocol
6 segment.

1 22. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a Real-Time Protocol header marker bit.

1 23. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a length field containing a length of a Real-Time Protocol

5 payload of a Real-Time Protocol packet of the compressed Real-Time Protocol
6 segment.

1 24. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a sequence number field carrying a Real-Time Protocol header
5 sequence number.

1 25. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment wherein the compressed
4 Real-Time Protocol segment format comprises a timestamp field carrying a Real-
5 Time Protocol header timestamp.

1 26. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media
4 packets that comprises a Real-Time Protocol payload of a Real-Time Protocol packet
5 that corresponds to the compressed Real-Time Protocol segment.

1 27. The method of Claim 7, wherein the aggregation protocol further comprises forming
2 the aggregated media payload based on a compressed Real-Time Protocol segment
3 format for each compressed Real-Time Protocol segment of the two or more media

4 packets that comprises a padding field that aligns an end of the compressed Real-
5 Time Protocol segment with a next boundary.

1 28. The method of Claim 1, wherein the two or more media packets are received while
2 traversing a common sub-route.

1 29. The method of Claim 1, further comprising the step of transmitting the aggregated
2 media packet when the aggregated media packet contains a sufficient number of Real-
3 time Protocol segments.

1 30. The method of Claim 29, wherein the sufficient number of Real-time Protocol
2 segments is a user-selected number.

1 31. The method of Claim 1, further comprising transmitting the aggregated media packet
2 when a maximum allowed delay time value is reached.

1 32. The method of Claim 1, further comprising:
2 using a maximum allowed delay time value for transmitting the aggregated media
3 packet;
4 starting a count down for the maximum allowed delay time value when a first media
5 packet arrives for aggregation; and
6 aggregating subsequent media packets that arrive before the maximum allowed delay
7 time value is reached.

1 33. An apparatus for transmitting media information associated with two or more
2 concurrent calls carried in a packet-switched network, the apparatus comprising:
3 means for aggregating two or more media packets from one or more source endpoints
4 into an aggregated media payload;
5 means for re-packetizing the aggregated media payload using a single aggregated
6 header to form an aggregated media packet.

1 34. An apparatus for transmitting media information associated with two or more
2 concurrent calls carried in a packet-switched network, the apparatus comprising:
3 one or more processors coupled to an aggregator for aggregating two or more media
4 packets into an aggregated media packet;
5 a memory accessible to the one or more processors; and
6 one or more sequences of instructions stored in the memory which, when executed by
7 the one or more processors, cause the one or more processors to carry out the
8 steps of:
9 aggregating two or more media packets from one or more source endpoints
10 into an aggregated media payload; and
11 re-packetizing the aggregated media payload using a single aggregated header
12 to form the aggregated media packet.

1 35. A computer-readable medium comprising one or more sequences of instructions for
2 efficiently transmitting media information associated with two or more concurrent
3 calls carried in a packet-switched network, which the sequences of instructions, when

